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(54) **TRANSGENIC MICE EXPRESSING CHIMERIC MAJOR HISTOCOMPATIBILITY COMPLEX (MHC) CLASS II MOLECULES**

(57) The invention provides genetically modified non-human animals that express a humanized MHC II protein (humanized MHC II α and β polypeptides), as well as embryos, cells, and tissues comprising the same. Also provided are constructs for making said genetically modified animals and methods of making the same. Methods of using the genetically modified animals to study various aspects of human immune system are provided.

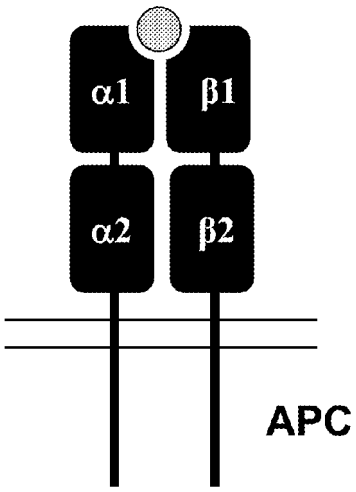


FIG. 1

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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,P	WO 2013/063340 A1 (REGENERON PHARMA) 2 May 2013 (2013-05-02) * paragraph [0010] - paragraph [0019] * * paragraph [0051] - paragraph [0059] * * claims 19-41 * * paragraph [0064] - paragraph [0095] *	1-15	INV. A01K67/0278 C07K14/705
E	WO 2014/130667 A1 (REGENERON PHARMA [US]) 28 August 2014 (2014-08-28) * paragraph [0016] - paragraph [0019]; claims 1-21 *	1-15	
A	US 2007/209083 A1 (THIAM KADER ET AL) 6 September 2007 (2007-09-06) * paragraphs [0008], [0009], [0021], [0058], [0059] * * claim 13 *	1-15	
A	ITO K ET AL: "HLA-DR4-IE CHIMERIC CLASS II TRANSGENIC, MURINE CLASS II-DEFICIENT MICE ARE SUSCEPTIBLE TO EXPERIMENTAL ALLERGIC ENCEPHALOMYELITIS", THE JOURNAL OF EXPERIMENTAL MEDICINE, ROCKEFELLER UNIVERSITY PRESS, US, vol. 183, no. 6, June 1996 (1996-06), pages 2635-2644, XP000994711, ISSN: 0022-1007, DOI: 10.1084/JEM.183.6.2635 * abstract * * page 2637, left-hand column, last paragraph - right-hand column, paragraph 1 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) A01K C07K

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	4 September 2026	Deleu, Laurent

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Application Number
EP 26 18 9923

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	A. WOODS ET AL: "Human major histocompatibility complex class II-restricted T cell responses in transgenic mice", JOURNAL OF EXPERIMENTAL MEDICINE, vol. 180, no. 1, July 1994 (1994-07), pages 173-181, XP055127351, ISSN: 0022-1007, DOI: 10.1084/jem.180.1.173 * abstract * * page 174, left-hand column, paragraph 2 * * figure 1 *	1-15	
A	WO 2005/004592 A2 (PASTEUR INSTITUT) 20 January 2005 (2005-01-20) * abstract * * paragraph [0009] *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
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EPO FORM 1503 03.82 (P04C01)

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04-09-2026

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2013063340 A1	02-05-2013	AU 2012327205 A1	23-05-2013
		AU 2016202317 A1	05-05-2016
		AU 2018201402 A1	15-03-2018
		AU 2021200438 A1	25-02-2021
		BR 112014009941 A2	22-12-2020
		CA 2852962 A1	02-05-2013
		CN 104039133 A	10-09-2014
		CN 108401986 A	17-08-2018
		CN 108707608 A	26-10-2018
		CY 1119283 T1	14-02-2018
		CY 1122700 T1	12-03-2021
		CY 1125196 T1	28-03-2025
		DK 2770822 T3	25-09-2017
		DK 3272214 T3	02-03-2020
		DK 3590332 T3	23-05-2022
		EP 2770822 A1	03-09-2014
		EP 3272214 A1	24-01-2018
		EP 3590332 A1	08-01-2020
		EP 4052572 A1	07-09-2022
		ES 2640241 T3	02-11-2017
		ES 2774488 T3	21-07-2020
		ES 2914374 T3	10-06-2022
		ES 3058981 T3	16-03-2026
		HK 1196999 A1	02-01-2015
		HK 1250131 A1	30-11-2018
		HR P20171327 T1	03-11-2017
		HR P20200305 T1	12-06-2020
		HR P20220616 T1	24-06-2022
		HU E034374 T2	28-02-2018
		HU E048511 T2	28-07-2020
		IL 243565 A	31-10-2017
		IL 260209 A	31-07-2018
		JP 6285361 B2	28-02-2018
		JP 6652529 B2	26-02-2020
		JP 2014532411 A	08-12-2014
		JP 2018019700 A	08-02-2018
		KR 20140089558 A	15-07-2014
		KR 20180132970 A	12-12-2018
		LT 2770822 T	10-10-2017
		LT 3272214 T	10-03-2020
		LT 3590332 T	10-08-2022
		MX 355726 B	27-04-2018
		MX 379060 B	10-03-2025
		NZ 623146 A	24-06-2016
		NZ 717130 A	27-07-2018
		PL 2770822 T3	30-11-2017

EPO FORM P0459

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 26 18 9923

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The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-09-2026

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		PL 3272214 T3	29-06-2020
		PL 3590332 T3	13-06-2022
		PT 2770822 T	18-09-2017
		PT 3272214 T	04-03-2020
		PT 3590332 T	27-05-2022
		RS 63220 B1	30-06-2022
		RU 2014116577 A	10-12-2015
		RU 2018115251 A	04-03-2019
		SG 10201510056S A	28-01-2016
		SG 10201909638U A	28-11-2019
		SG 11201400938U A	28-04-2014
		SI 2770822 T1	30-10-2017
		SI 3272214 T1	30-04-2020
		SI 3590332 T1	29-07-2022
		SM T201700437 T1	15-11-2017
		SM T202000114 T1	13-03-2020
		SM T202200205 T1	21-07-2022
		US 2013111616 A1	02-05-2013
		US 2015040253 A1	05-02-2015
		US 2017135329 A1	18-05-2017
		US 2019239496 A1	08-08-2019
		US 2019239497 A1	08-08-2019
		US 2021195878 A1	01-07-2021
		US 2024365761 A1	07-11-2024
		WO 2013063340 A1	02-05-2013
WO 2014130667 A1	28-08-2014	AU 2014218893 A1	10-09-2015
		AU 2018271326 A1	20-12-2018
		CA 2900824 A1	28-08-2014
		CN 105164154 A	16-12-2015
		CN 110192541 A	03-09-2019
		CY 1121223 T1	29-05-2020
		DK 2958937 T3	26-11-2018
		EP 2958937 A1	30-12-2015
		EP 3421490 A1	02-01-2019
		EP 3699190 A1	26-08-2020
		ES 2697248 T3	22-01-2019
		ES 2798751 T3	14-12-2020
		ES 2949029 T3	25-09-2023
		HK 1214613 A1	29-07-2016
		HR P20181866 T1	25-01-2019
		HU E041878 T2	28-06-2019
		JP 6444321 B2	26-12-2018
		JP 6681939 B2	15-04-2020
		JP 2016507247 A	10-03-2016
		JP 2018126170 A	16-08-2018

EPO FORM P0459

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 26 18 9923

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04-09-2026

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		KR 20150122710 A	02-11-2015
		LT 2958937 T	26-11-2018
		PL 2958937 T3	31-01-2019
		PT 2958937 T	27-11-2018
		SI 2958937 T1	31-12-2018
		SM T201800614 T1	11-01-2019
		US 2014245467 A1	28-08-2014
		US 2019133095 A1	09-05-2019
		US 2022201994 A1	30-06-2022
		WO 2014130667 A1	28-08-2014
US 2007209083 A1	06-09-2007	CA 2453928 A1	23-01-2003
		EP 1414949 A1	06-05-2004
		FR 2827302 A1	17-01-2003
		US 2005066375 A1	24-03-2005
		US 2007209083 A1	06-09-2007
		WO 03006639 A1	23-01-2003
WO 2005004592 A2	20-01-2005	AT E541455 T1	15-02-2012
		CA 2534090 A1	20-01-2005
		CN 1859843 A	08-11-2006
		CN 102727875 A	17-10-2012
		EP 1659858 A2	31-05-2006
		ES 2381109 T3	23-05-2012
		US 2005114910 A1	26-05-2005
		US 2011067121 A1	17-03-2011
		US 2011142862 A1	16-06-2011
		US 2017079253 A1	23-03-2017
		WO 2005004592 A2	20-01-2005

EPO FORM P0459

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